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Public Health Guidelines for Enhancing Diabetes Control Through Maternal- and Child-Health Programs

These guidelines were developed by the Division of Diabetes Control, Center for Prevention Services, CDC, in collaboration with the Division of Maternal and Child Health, Bureau of Health Care Delivery and Assistance, Health Resources and Services Administration, and have been endorsed by the Association for Maternal and Child Health and Crippled Children's Programs.

INTRODUCTION

This document provides guidelines for maternal- and child-health programs for an appropriate public health approach to diabetes control during pregnancy. Particular concerns for the public health-care sector include: (1) screening of women to detect gestational diabetes; (2) identification of women with established diabetes who may become pregnant; (3) ensurance of appropriate care for women with diagnosed diabetes (either established or gestational) on-site or through referral; (4) postpartum follow-up and continuing care of women with established diabetes to maintain good blood-glucose control before pregnancy and throughout subsequent pregnancies; and (5) postpartum follow-up of women with gestational diabetes to detect previously undiagnosed established diabetes, to monitor the maintenance of ideal body weight to reduce the chance of developing diabetes later in life, and to ensure prompt diagnosis of diabetes if and when it develops. Key elements are: the identification and establishment of linkages with existing programs and resources and development of the necessary referral and follow-up mechanisms.

STATEMENT OF THE PROBLEM

The presentation of a pregnant woman with established diabetes mellitus* or gestational diabetes mellitus† (GDM) to a public health clinic is relatively rare (about 3%-4% of all pregnancies). However, the morbidity associated with pregnancies affected by diabetes may be substantial, since diabetes may result in a disproportionate number of adverse pregnancy outcomes (*1*). Therefore, the combination of diabetes and pregnancy presents a special challenge in the public health-care setting.

Incorporating several basic guidelines and principles into the public health sector's management of pregnancy may markedly improve pregnancy outcomes for women with either established or gestational diabetes. With appropriate care, the level of risk associated with diabetes and pregnancy can be reduced to that of the nondiabetic population.

*Diabetes diagnosed before conception.

†Carbohydrate intolerance of variable severity with onset or first recognition during pregnancy.

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Problems Related to Established Diabetes. While only approximately 0.3% of all U.S. pregnancies occurs among women with established diabetes, many serious clinical problems are associated with diabetes during pregnancy. The estimated 10,000-14,000 infants born annually to women with established diabetes are at high risk for mortality; prematurity; congenital defects; macrosomia; neonatal hypoglycemia; respiratory distress syndrome; and hyperbilirubinemia, particularly when maternal glucose levels are not tightly controlled during pregnancy (*1*).

Risks of maternal complications are also associated with diabetes during pregnancy and include: ketoacidosis; exacerbated microvascular, renal, ocular, and neural complications; urinary-tract infections; toxemia; and hydramnios (*2*).

Problems Related to Gestational Diabetes. GDM occurs in about 2%-3% of pregnancies in the United States (*3*) and usually develops during the second or third trimester, when levels of insulin-antagonist hormones increase and insulin resistance usually occurs. Approximately 90,000 women with GDM give birth each year. GDM may go undetected in up to 50% of cases.

The effects of GDM on offspring include: macrosomia; birth trauma due to difficult delivery; shoulder dystocia; hypoglycemia; increased incidence of fetal/neonatal mortality (particularly from women with previously unidentified adult-onset, Type II, diabetes); hypocalcemia; and hyperbilirubinemia (*4*).

Women with GDM are at increased risk for developing diabetes after parturition (*5*). In addition, many women diagnosed as glucose-intolerant during pregnancy may be previously unidentified Type II diabetics. This risk of developing diabetes and the opportunity to identify as yet undiagnosed women with Type II diabetes are also compelling reasons for screening.

Opportunities to Improve Outcomes. The public health sector can improve pregnancy outcomes among women with established diabetes and women in whom GDM is detected by several methods, including: (1) identification (including outreach, screening, and diagnosis); (2) care/referral (including appropriate patient education and nutrition counseling, referrals to high-risk centers or to private care); (3) maternal/neonatal follow-up; and (4) professional education.

Purpose of the Guidelines. The guidelines should be adapted to the needs of each state, its health-care delivery system, and the levels of professional and fiscal resources available. The guidelines are designed to: (1) increase public and provider awareness of the problem and identify special needs related to diabetes before conception and during pregnancy; (2) propose concrete suggestions for enhancing diabetes control through maternal- and child-health programs in the public health system by improving coordination of the health-care system components, use of resources, and patient involvement in the care regimen; and (3) provide a framework for states/localities to use in adapting these guidelines to meet their specific planning, care, and training needs.

IDENTIFICATION OF WOMEN WITH DIABETES

Outreach. Prepregnancy counseling and early prenatal care by professionals knowledgeable about diabetes during pregnancy are particularly important for women with established diabetes (*6*). Normalization of maternal glucose levels before pregnancy and during the first 8 weeks of gestation has been effective in reducing the occurrence of congenital malformations (*1*). Strict control of glucose throughout pregnancy can reduce the risk of perinatal mortality among infants of mothers with diabetes to a level seen in nondiabetic pregnant women. Therefore, prepregnancy counseling—with the goal of attaining euglycemia before conception and maintaining it throughout gestation—is important for women with diabetes. Prepregnancy

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evaluation is also important to assess maternal complications of diabetes, such as detecting the presence of retinopathy, nephropathy, hypertension, and coronary atherosclerosis.

Ideally, a woman with established diabetes is aware of the risks associated with diabetes and pregnancy and will consult a physician when contemplating pregnancy. In reality, however, most women come to public health-care settings already several weeks pregnant. Outreach efforts for women with established diabetes include:

1. Identifying women with established diabetes who come to family planning clinics and encouraging referral for prepregnancy counseling;
2. Asking women with diabetes already under care to disseminate messages to their friends and acquaintances (e.g., through support groups) about the importance of preconception counseling and prenatal care;
3. Discussing with women who have established diabetes the importance of glycemic control before pregnancy when they bring children into public health clinics for care;
4. Increasing provider awareness through professional education;
5. Enlisting the aid of local American Diabetes Association or Juvenile Diabetes Foundation chapters in arranging for public service announcements regarding the importance of planned pregnancy and early care for women with diabetes;
6. Developing media campaigns that encourage preconception and early prenatal care (e.g., placing posters in highly visible areas);
7. Providing patient-education materials to local physicians;
8. Recruiting and training persons indigenous to the target population, such as volunteers or community-health workers, to stress the importance of preconception and early prenatal care and proper nutrition during pregnancy;
9. Identifying home-health nurses and enlisting their aid in referral for specialized and follow-up care during pregnancy;
10. Maintaining communications with directors of nursing and education coordinators of outlying hospitals to ensure the availability of patient-education opportunities;
11. Working with primary-care centers;
12. Developing and identifying specialized-care referral centers for women with established diabetes or GDM who cannot be adequately treated in a public health-care setting.

To maximize resources, localities should develop an outreach plan to target their efforts and to optimally use scarce public health resources.

Unlike women with established diabetes, women who develop GDM need to be identified by health-care providers. Therefore, outreach efforts related to identifying GDM should be targeted at those health-care professionals who have contact with pregnant women (e.g., nurse-midwives, nurse-practitioners, family practitioners, obstetricians, and nutritionists).

Screening and Diagnosis. Screening and diagnostic activities in the public health-care setting focus on identifying women who develop GDM. The following recommendations for GDM screening and diagnosis were formulated at the Second International Workshop-Conference on Gestational Diabetes Mellitus (7).

Many investigators have supported the view that certain risk factors may assist in identifying pregnant women prone to developing GDM. These include: age of 25 years or older; obesity; history of diabetes in a first-degree relative; history of pregnancy with stillbirth or infant over 9 pounds; and history of congenital malformation in a previous child. Although a history of hypertension is often cited as a risk factor for GDM, it does not necessarily assist in identifying a woman prone to develop GDM. However, it is a serious coexisting condition and

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can increase the risk of adverse outcome in women with GDM. It is now well accepted that only universal screening can completely identify all patients with GDM. However, most pregnant patients with these specific risk factors will not have GDM, since GDM occurs in only approximately 2%-3% of the population.

Therefore, it is recommended that, where possible, all pregnant women be screened for GDM (7). In public health settings, universal screening may not be possible. Therefore, if factors exist that preclude universal screening, all women 25 years of age or older and women with any of the above-mentioned risk factors (regardless of age) should be screened. These factors are not only associated with greater risk of developing GDM but are more often associated with poor perinatal outcome.

Urine testing alone is not an adequate screening test for glucose intolerance during pregnancy. Blood-glucose screening should be performed between 24 weeks' and 28 weeks' gestation. The following glucose challenge test is recommended: (1) patient is given 50 grams of a standard glucose solution to be ingested in a 10-minute period without regard to time of day or last meal; (2) patient should not eat or smoke until 1-hour blood sample is drawn; (3) blood sample is taken at 1 hour and analyzed by standard techniques available to the health department. A venous plasma-glucose result of 140 mg/dl (7.8 mmol/L) is recommended as a threshold for referral for definitively diagnosing GDM. Whole blood-glucose standards are approximately 15% less than plasma-glucose values.

Indications for screening before 24 weeks' gestation include: (1) previous GDM; (2) previous large-for-gestational-age infant; (3) polyhydramnios; (4) suspected large-for-gestational-age fetus; (5) glycosuria value of 1+ or greater on two or more occasions or 2+ or greater on one occasion; (6) increased thirst or urination; (7) recurrent vaginal and urinary-tract infections (e.g., monilial vulvovaginitis). These high-risk women should be screened on initial visit, or as soon as possible in the pregnancy, and again at 24 weeks' gestation (if not positive on the earlier test).

If blood-glucose meters are used for screening, the cut-off values will differ, and the sensitivity and specificity of the procedure will vary from screening using venous plasma. A lower value should be used as a screening cut-off for referral for definitive diagnosis.

Definitive diagnosis of GDM should be accomplished with a 100-gram oral glucose-tolerance test (OGTT). The test should be performed in the morning after an overnight fast of at least 8 hours but not more than 14 hours, and after at least 3 days' unrestricted diet (over 150 grams carbohydrate) and physical activity. A 100-gram oral glucose load is given in a volume of at least 400 ml fluid. Venous plasma glucose is measured fasting and at 1, 2, and 3 hours. The patient should remain seated and not smoke throughout the test. Definitive diagnosis requires that two or more of the following venous plasma-glucose concentrations be met or exceeded:

fasting: 105 mg/dl (5.8 mmol/L)
1-hour: 190 mg/dl (10.6 mmol/L)
2-hour: 165 mg/dl (9.2 mmol/L)
3-hour: 145 mg/dl (8.1 mmol/L)

Capillary blood measurements, using glucose oxidase-impregnated test strips, are useful for monitoring therapy but not sufficiently accurate for diagnostic purposes. Glycosylated hemoglobin (i.e., HbA_1 or HbA_{1c}) is also not a sensitive enough diagnostic indicator for GDM.

REFERRAL TO CARE

Women with established diabetes and women who develop GDM should be considered at high risk and be referred immediately for specialized care if such care is not available on-site.

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This will ensure that activities, such as determination of the appropriate level of care needed by prepregnant and pregnant women with diabetes, consultation, training, referral, and follow-up, can best be coordinated within the various components of the health-care system, be it a public health setting, private medical setting, hospital, or community clinic. Optimally, a perinatal center for high-risk individuals will be available—particularly for women with established diabetes mellitus—that offers a multidisciplinary team consisting of an obstetrician/perinatologist, an internist/endocrinologist, a social worker, a dietitian, and a nurse/patient educator. If this level of care is unavailable, the patient should receive, at a minimum, care from a local obstetrician knowledgeable in management of diabetes during pregnancy. Patient education should be an integral part of medical care. The public health role in referrals is to identify care resources, assure access to care, follow up to ensure that care is obtained, and assure that the care obtained is appropriate.

Obtaining a plan of care from the provider to whom a referral is made is desirable for several reasons: (1) it describes the elements that will/will not be provided, which helps the public health clinic identify other resources that may be needed to fill gaps; (2) it provides information on the comprehensiveness and quality of care provided by professionals/facilities to whom patients are referred; and (3) it may be valuable for follow-up for postpartum care or subsequent pregnancies.

The public health sector should retain a role in certain aspects of patient care (such as follow-up, education, social services, transportation, home visits), even though patients may be referred for special needs. While direct care may not be provided to high-risk women in the public health-care setting, public health professionals should be aware of the elements of appropriate care to assess the quality of services provided by the professionals/facilities to whom they refer.

Elements of Care for Women with Gestational Diabetes.

1. It is recommended that each patient be seen at regular intervals and have a provider available by phone to discuss any problems.
2. Dietary management is the primary therapeutic strategy for blood-glucose control. Each patient should receive nutrition assessment and counseling.
3. Blood pressure should be monitored carefully.
4. Maternal weight gain should be monitored. In general, a total weight gain of 24-28 pounds has been recommended. Excessive changes in weight should be avoided, and patients should not attempt to lose weight. A woman's nutritional status needs to be monitored carefully; weight-gain recommendations need to be individualized; and nutrition-care plans need to be developed accordingly with considerations to factors such as exercise/activity patterns, insulin dosages or other medications, and individual food preferences. A woman's pregravid weight seems to be the most sensitive indicator for weight gain during pregnancy. Many studies propose that women who are underweight pregravid may need to gain more than the usually recommended 24-28 pounds for a normal weight pregravid woman. Similarly, for women who are overweight or obese pregravid—often a predisposing risk factor for developing GDM—weight gains of less than 24-28 pounds may be sufficient, and intakes of 30 kcal/kg ideal body weight appropriately balanced with carbohydrates, fats, and proteins may be more appropriate. Considerably more research in the area is needed.
5. In many centers, if dietary management is not successful in maintaining control (fasting plasma glucose under 105 mg/dl [5.8 mmol/L] and/or the 2-hour postprandial plasma glucose under 120 mg/dl [6.7 mmol/L] on two or more occasions within a 2-week in-

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terval), insulin therapy is initiated (*7*). Although these values are even less than those recommended for nonpregnant women with diabetes, the benefits of tight control are believed to outweigh more lax control. Patients should be treated with highly purified nonbeef or human insulin to minimize the likelihood of problems related to insulin antibodies. The safety of oral hypoglycemic agents during pregnancy has not been adequately evaluated, and they are not recommended. If the patient is put on insulin, treatment guidelines for women with established diabetes should be followed.

6. If insulin is the therapy of choice, blood glucose should be self-monitored, and patients should be educated to ensure appropriate use and evaluated regularly. (Urine testing is not a sufficiently reliable indicator of blood-glucose levels during pregnancy.) Patients who use insulin should measure fasting blood glucose and 2-hour postprandial blood glucose daily to maintain glycemic control as near to normal as possible.
7. Ketones should be measured in the clinic and followed up, if positive, to prevent starvation ketosis. If the patient is losing weight, a dietary history should be obtained and caloric intake adjusted carefully based on pregravid weight, levels of exercise, etc.
8. Breast-feeding should be encouraged.

Elements of Care for Women with Established Diabetes.

1. Pregnancy should be planned so that blood glucose can be normalized before conception and throughout gestation.
2. Throughout pregnancy, glucose levels must be monitored daily by the patient (a minimum of four times daily for best results), and on each visit, by the health-care provider.
3. The safety of oral hypoglycemic agents in pregnancy has not been established, and they are not recommended.
4. The majority of pregnant women with established diabetes will require twice-daily injections of both intermediate- and short-acting insulin for control. For patients on twice-daily insulin injections, a dietary program consisting of three meals and three snacks has been suggested.
5. Maternal serum alpha-fetoprotein screening for detecting neural-tube defects should be performed on all pregnant women at about 16 weeks' gestation, especially those with established diabetes.

Nutrition Counseling.

1. The public health-care sector should ensure that nutrition counseling is available. Certain principles apply for both gestational and established diabetes.
2. Each patient should receive individual nutrition assessment and counseling consistent with the recommendations for caloric distribution prepared by the American Diabetes Association in 1979 (*8*).
3. The nutrition plan should contain 35-38 kcal/kg ideal body weight and be appropriately balanced with carbohydrates, fats, and proteins (*7*).
4. Patients should divide their caloric intake among three meals and several snacks.
5. The average daily caloric intake for the pregnant woman with diabetes will range from 2,000 to 2,400 calories. Lactating women may require an additional 600-800 calories daily more than a normal diet for a nonpregnant woman.
6. Obese patients should not lose weight during pregnancy because weight loss may increase the risks for retarded fetal growth. On the average, a woman should gain 24-28 pounds during pregnancy.

Patient Education. Diabetes in pregnancy cannot be managed adequately without patient education and self-management. Therefore, the public health clinic should ensure that patient education is an integral component of the care plan developed for each patient. All pregnant

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women identified with either GDM or established diabetes should receive: (1) information about the interaction of pregnancy and diabetes; (2) information on the importance and frequency of blood-glucose self-monitoring (established diabetes and gestational if managed with insulin); (3) instruction on how to self-monitor blood glucose (established diabetes only, unless GDM treated with insulin) and urine testing for ketones; (4) instruction regarding use of medications; and (5) exercise instruction.

In addition, women with GDM should be instructed in the importance of postpartum weight control, including appropriate exercise, due to the increased likelihood of developing diabetes in later years. Women with established diabetes should be instructed in the importance of preconception counseling and blood-glucose normalization before conception in future pregnancies to reduce the risk of congenital anomalies from diabetes. In addition, women should be aware that pregnancy can exacerbate complications of diabetes.

The public health sector can play a major role in instructing patients about self-monitoring. Self-monitoring demonstrates the day-to-day variability in glucose levels; promotes self-discipline, control, and a heightened understanding of the condition; provides immediate feedback on hyperglycemia or hypoglycemia; and provides essential data to enable pregnant women and their health-care providers to make appropriate changes in diet, exercise, and insulin therapy.

Because urine-glucose testing is not a sufficiently reliable indicator of glucose levels, frequent blood-glucose determinations are strongly recommended throughout pregnancy for women with established diabetes or with GDM controlled with insulin. The practitioner should instruct the pregnant woman with established diabetes to test urine for ketones and to self-monitor blood glucose throughout pregnancy. Patients with established diabetes should be informed that insulin requirements may increase substantially in the second and third trimesters. The public health-care sector should ensure the availability of equipment critical to self-monitoring.

FOLLOW-UP

Short- and long-term follow-up are integral components of care for this high-risk population. In the short term, it is important for the public health sector to identify sources of care during pregnancy to which patients can be referred and then to make certain the referrals are completed.

For women with GDM, a repeat oral glucose-tolerance test (OGTT) is recommended at the first postpartum check-up. If the test is positive, the patient should be provided with or referred for treatment; if the test is negative, the patient should be advised that she is still at risk of developing diabetes later in life. She should be informed that the onset of diabetes may be delayed or prevented if she attains and maintains ideal body weight, and, if necessary, a referral for counseling on diet and/or weight control should be made. Regular follow-up and an annual OGTT are recommended.

Follow-up for the woman with established diabetes entails an adjustment of the insulin dosage after delivery (usually to the prepregnancy level), informing the mother about the importance of returning to her ideal body weight, and achieving and maintaining good blood-glucose control postpartum. In addition, it is important to provide counseling for the woman with established diabetes regarding the importance of glucose control before any subsequent pregnancies. Referral to a family planning clinic for an appropriate contraceptive method may also be appropriate.

RECOMMENDED RESOURCES

Successful pregnancy outcomes depend on linkages and referrals to appropriate care and services. A list of resources that may be used for referral or that may provide educational and

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promotional materials is presented below. While this list is not exhaustive, it is indicative of the resources available to improve pregnancy outcomes.

American Association of Diabetes Educators
American College of Obstetricians and Gynecologists
American Diabetes Association
Division of Diabetes Control, Center for Prevention Services, CDC
Crippled Children's Programs
Diabetes Research and Training Centers
Family Planning Clinics
Juvenile Diabetes Foundation
Maternal and Child Health Programs
National Diabetes Advisory Board
National Diabetes Information Clearinghouse
National Institute of Child Health and Human Development

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TABLE I. Summary—cases specified notifiable diseases, United States

Disease	13th Week Ending			Cumulative, 13th Week Ending		
	Mar. 29, 1986	Mar. 30, 1985	Median 1981-1985	Mar. 29, 1986	Mar. 30, 1985	Median 1981-1985
Acquired Immunodeficiency Syndrome (AIDS)	295	361	N	2,914	1,587	N
Aseptic meningitis	73	80	80	1,039	898	1,022
Encephalitis: Primary (arthropod-borne & unspec.)	17	21	21	208	228	222
Post-infectious	4	5	2	17	31	22
Gonorrhea: Civilian	14,721	15,766	15,976	193,605	194,612	225,508
Military	239	514	503	3,893	4,859	6,012
Hepatitis: Type A	438	447	464	5,596	5,285	5,767
Type B	536	484	484	5,974	6,075	5,674
Non A, Non B	68	98	N	783	1,037	N
Unspecified	91	107	146	1,276	1,266	1,817
Legionellosis	18	7	N	137	156	N
Leprosy	4	7	7	64	102	51
Malaria	6	13	18	165	167	167
Measles: Total*	395	210	76	1,299	547	547
Indigenous	395	186	N	1,262	453	N
Imported	-	24	N	37	94	N
Meningococcal infections: Total	70	57	74	826	794	893
Civilian	68	57	74	823	793	893
Military	2	-	-	3	1	3
Mumps	70	107	107	705	1,045	1,096
Pertussis	25	22	39	484	377	359
Rubella (German measles)	3	8	37	117	84	287
Syphilis (Primary & Secondary): Civilian	447	630	549	5,927	6,184	7,529
Military	3	6	6	52	43	96
Toxic Shock syndrome	8	6	N	73	96	N
Tuberculosis	368	390	479	4,651	4,569	5,309
Tularemia	1	1	1	17	24	23
Typhoid fever	2	9	15	51	59	90
Typhus fever, tick-borne (RMSF)	1	2	2	12	11	14
Rabies, animal	120	159	143	1,085	1,079	1,263

TABLE II. Notifiable diseases of low frequency, United States

	Cum 1986		Cum 1986
Anthrax	-	Leptospirosis (R.I. 1)	12
Botulism: Foodborne	3	Plague	-
Infant	12	Poliomyelitis, Paralytic	-
Other	-	Psittacosis (Tex. 1)	14
Brucellosis	12	Rabies, human	-
Cholera	-	Tetanus	7
Congenital rubella syndrome	1	Trichinosis	7
Congenital syphilis, ages < 1 year	-	Typhus fever, flea-borne (endemic, murine)	1
Diphtheria	-		

*There were no cases of internationally imported measles reported for this week.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending March 29, 1986 and March 30, 1985 (13th Week)

Reporting Area	AIDS	Aseptic Menin-gitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionel-losis	Leprosy
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1986	1986	Cum. 1986	Cum. 1986	Cum. 1986	Cum. 1985	1986	1986	1986	1986	1986	Cum. 1986
UNITED STATES	2,914	73	208	17	193,605	194,612	438	536	68	81	18	64
NEW ENGLAND	129	1	8	1	4,532	6,208	6	48	5	4	2	1
Maine	6	1	-	-	223	245	-	-	-	-	-	-
N.H.	6	-	2	-	129	128	-	-	-	-	-	-
Vt.	2	-	2	1	76	55	-	1	-	-	-	-
Mass.	72	-	2	-	1,914	2,365	3	25	4	2	1	1
R.I.	9	-	-	-	445	461	1	8	-	-	1	-
Conn.	34	-	2	-	1,745	2,954	2	14	1	2	-	-
MID ATLANTIC	1,070	6	36	-	33,708	25,878	18	53	7	5	-	7
Upstate N.Y.	98	-	12	-	3,905	3,909	6	17	2	-	-	-
N.Y. City	691	2	9	-	19,951	10,822	-	1	-	5	-	7
N.J.	193	4	4	-	3,788	5,742	5	18	3	-	-	-
Pa.	88	-	11	-	6,064	5,405	7	17	2	-	-	-
E.N. CENTRAL	152	8	42	2	24,537	28,296	36	77	6	3	7	3
Ohio	30	3	13	2	6,995	7,228	6	27	-	2	7	-
Ind.	17	2	3	-	3,708	2,807	6	15	1	1	-	-
Ill.	67	-	5	-	3,616	8,112	19	13	2	-	-	2
Mich.	33	3	20	-	8,591	8,098	5	22	3	-	-	1
Wis.	5	-	1	-	1,627	2,051	-	-	-	-	-	-
W.N. CENTRAL	61	2	5	1	9,185	9,936	10	10	3	-	-	1
Minn.	30	1	3	-	1,320	1,478	4	-	1	-	-	1
Iowa	5	-	2	-	889	1,081	1	4	1	-	-	-
Mo.	15	1	-	-	4,420	4,550	1	6	1	-	-	-
N. Dak.	2	-	-	-	89	77	-	-	-	-	-	-
S. Dak.	1	-	-	-	187	166	4	-	-	-	-	-
Nebr.	3	-	-	-	656	954	-	-	-	-	-	-
Kans.	5	-	-	1	1,624	1,630	-	-	-	-	-	-
S. ATLANTIC	398	20	35	10	43,649	42,691	36	71	11	4	4	1
Del.	8	-	3	-	842	897	2	-	-	-	-	-
Md.	37	6	9	-	6,210	6,736	-	10	-	-	1	-
D.C.	63	-	-	-	3,833	3,525	1	-	-	-	-	-
Va.	46	1	14	-	4,433	4,571	1	12	-	-	-	1
W. Va.	2	-	3	-	625	527	2	2	1	1	-	-
N.C.	20	2	5	-	8,844	8,411	2	6	1	-	3	-
S.C.	14	-	-	-	4,682	5,212	-	4	-	1	-	-
Ga.	27	1	-	-	-	-	2	11	2	-	-	-
Fla.	181	10	1	10	14,180	12,812	26	26	7	2	-	-
E.S. CENTRAL	28	-	15	1	17,136	17,152	1	40	4	5	-	-
Ky.	7	-	6	-	2,053	1,924	-	3	-	2	-	-
Tenn.	12	-	1	1	6,826	6,751	-	25	1	2	-	-
Ala.	5	-	8	-	4,595	5,263	1	8	2	1	-	-
Miss.	4	-	-	-	3,662	3,214	-	4	1	-	-	-
W.S. CENTRAL	272	12	17	-	25,132	28,014	68	46	5	43	1	5
Ark.	7	-	-	-	2,303	2,609	1	4	-	3	-	-
La.	34	1	1	-	4,188	5,897	3	2	1	3	-	-
Okla.	11	1	4	-	2,927	2,814	11	2	-	1	1	-
Tex.	220	10	12	-	15,714	16,694	53	38	4	36	-	5
MOUNTAIN	75	1	10	1	6,604	6,412	34	30	2	5	1	7
Mont.	1	-	-	1	166	199	2	-	-	-	-	-
Idaho	1	-	-	-	215	225	-	1	-	-	-	-
Wyo.	2	-	2	-	138	171	1	2	-	-	-	-
Colo.	35	-	2	-	1,711	1,941	-	5	-	2	-	3
N. Mex.	6	-	-	-	665	761	4	-	-	1	1	-
Ariz.	18	-	4	-	1,980	1,851	18	17	2	2	-	2
Utah	6	-	1	-	273	267	3	4	-	-	-	-
Nev.	6	1	1	-	1,456	997	6	1	-	-	-	2
PACIFIC	729	23	40	1	29,122	30,025	229	161	25	12	3	39
Wash.	34	-	2	-	2,142	2,219	14	18	4	2	-	5
Oreg.	14	-	-	-	1,130	1,624	41	19	3	-	-	-
Calif.	663	21	36	1	24,696	24,950	173	123	18	9	3	32
Alaska	8	-	2	-	839	757	1	-	-	1	-	-
Hawaii	10	2	-	-	315	475	-	1	-	-	-	2
Guam	-	-	-	-	13	42	-	1	-	-	-	-
P.R.	27	-	2	-	543	1,025	2	2	-	4	U	-
V.I.	-	U	-	-	47	103	U	U	U	U	U	-
Pac. Trust Terr.	-	U	-	-	18	235	16	U	U	1	U	-
Amer. Samoa	-	-	-	-	8	-	2	1	-	-	-	-

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending March 29, 1986 and March 30, 1985 (13th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported *		Total									
	Cum. 1986	1986	Cum. 1986	1986	Cum. 1986	Cum. 1985	Cum. 1986	1986	Cum. 1986	1986	Cum. 1986	Cum. 1985	1986	Cum. 1986	Cum. 1985
UNITED STATES	165	395	1,262	-	37	547	826	70	705	25	484	377	3	117	84
NEW ENGLAND	9	-	9	-	-	22	61	3	14	1	31	18	-	1	5
Maine	-	-	-	-	-	-	11	-	-	-	2	2	-	-	-
N.H.	-	-	-	-	-	-	3	-	5	-	11	11	-	1	2
Vt.	1	-	-	-	-	-	9	-	-	-	1	2	-	-	-
Mass.	4	-	9	-	-	22	14	1	1	1	9	2	-	-	3
R.I.	1	-	-	-	-	-	6	-	4	-	1	1	-	-	-
Conn.	3	-	-	-	-	-	18	2	4	-	7	-	-	-	-
MID.ATLANTIC	23	81	468	-	3	35	141	5	50	2	68	52	1	23	15
Upstate N.Y.	2	-	1	-	2	17	39	2	19	1	41	29	1	15	5
N.Y. City	7	1	53	-	1	16	35	-	5	-	5	7	-	5	7
N.J.	3	80	414	-	-	2	20	1	10	-	4	1	-	3	3
Pa.	11	-	-	-	-	-	47	2	16	1	18	15	-	-	-
E.N. CENTRAL	4	10	93	-	2	234	99	28	323	1	115	61	-	1	8
Ohio	1	-	-	-	-	11	46	2	45	-	59	13	-	-	-
Ind.	-	-	-	-	-	1	10	-	14	-	9	11	-	-	-
Ill.	2	10	48	-	-	138	24	14	152	-	12	10	-	-	2
Mich.	1	-	-	-	-	45	19	11	49	1	12	7	-	-	5
Wis.	-	-	45	-	2	39	-	1	63	-	23	20	-	1	1
W.N. CENTRAL	4	7	68	-	-	3	41	-	22	-	27	32	-	2	6
Minn.	1	-	-	-	-	1	10	-	1	-	15	10	-	-	-
Iowa	1	-	-	-	-	-	6	-	5	-	4	1	-	-	-
Mo.	2	-	-	-	-	2	18	-	7	-	3	8	-	1	-
N. Dak.	-	-	-	-	-	-	-	-	2	-	2	5	-	-	-
S. Dak.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Nebr.	-	-	-	-	-	-	5	-	-	-	-	1	-	-	-
Kans.	-	7	68	-	-	-	2	-	6	-	3	7	-	1	6
S. ATLANTIC	23	33	188	-	2	19	183	6	61	2	92	90	-	6	6
Del.	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Md.	3	1	5	-	-	1	20	1	4	-	20	23	-	-	1
D.C.	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-
Va.	6	-	-	-	-	7	37	3	9	-	9	2	-	-	-
W. Va.	-	-	-	-	-	2	2	1	23	-	2	-	-	-	-
N.C.	3	-	-	-	-	-	27	-	4	1	13	6	-	-	-
S.C.	-	32	172	-	-	-	22	1	6	-	2	-	-	-	2
Ga.	3	-	-	-	1	5	27	-	4	1	40	45	-	-	-
Fla.	8	-	11	-	1	3	45	-	11	-	6	14	-	6	3
E.S. CENTRAL	4	-	-	-	-	-	42	-	5	2	14	4	-	1	1
Ky.	2	-	-	-	-	-	6	-	2	-	1	1	-	1	1
Tenn.	-	-	-	-	-	-	19	-	1	2	4	1	-	-	-
Ala.	2	-	-	-	-	-	13	-	1	-	9	2	-	-	-
Miss.	-	-	-	-	-	-	4	-	1	-	-	-	-	-	-
W.S. CENTRAL	13	244	281	-	12	3	56	8	58	2	21	27	-	23	13
Ark.	-	244	265	-	-	-	5	2	5	1	1	7	-	-	1
La.	4	-	-	-	-	-	6	-	-	-	3	1	-	-	-
Okla.	1	-	2	-	-	-	10	N	N	1	17	19	-	-	-
Tex.	8	-	14	-	12	3	35	6	53	-	-	-	-	23	12
MOUNTAIN	5	3	38	-	5	163	35	10	91	7	67	19	-	-	3
Mont.	-	-	-	-	1	115	4	-	2	-	-	2	-	-	-
Idaho	1	-	-	-	-	-	1	-	2	2	15	-	-	-	1
Wyo.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Colo.	1	-	-	-	2	-	7	-	4	2	16	8	-	-	-
N. Mex.	-	-	13	-	2	-	4	N	N	-	8	3	-	-	1
Ariz.	2	3	25	-	-	48	11	10	79	1	20	3	-	-	1
Utah	-	-	-	-	-	-	4	-	1	2	8	3	-	-	-
Nev.	1	-	-	-	-	-	2	-	3	-	-	-	-	-	-
PACIFIC	80	17	117	-	13	68	168	10	81	8	49	74	2	60	27
Wash.	8	-	22	-	7	1	24	-	4	5	23	11	-	-	-
Oreg.	8	-	-	-	2	-	14	N	N	-	2	16	-	-	1
Calif.	64	17	79	-	4	60	124	10	70	3	21	44	2	60	24
Alaska	-	-	-	-	-	-	5	-	2	-	1	1	-	-	-
Hawaii	-	-	16	-	-	7	1	-	5	-	2	2	-	-	2
Guam	1	-	1	-	-	10	-	-	1	-	-	-	-	2	1
P.R.	1	-	-	-	-	39	2	-	14	-	2	1	-	-	4
V.I.	-	U	-	U	-	9	-	U	5	U	-	-	U	-	-
Pac. Trust Terr.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable U: Unavailable †International §Out-of-state

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending March 29, 1986 and March 30, 1985 (13th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1986	Cum. 1985	1986	Cum. 1986	Cum. 1985	Cum. 1986	Cum. 1986	Cum. 1986	Cum. 1986
UNITED STATES	5,927	6,184	8	4,651	4,569	17	51	12	1,085
NEW ENGLAND	130	139	-	143	161	-	2	1	-
Maine	8	5	-	14	13	-	-	-	-
N.H.	6	3	-	2	6	-	-	-	-
Vt.	4	-	-	7	1	-	-	-	-
Mass.	67	76	-	74	97	-	1	1	-
R.I.	8	5	-	5	16	-	-	-	-
Conn.	37	50	-	41	28	-	1	-	-
MID. ATLANTIC	883	796	3	892	905	-	6	-	114
Upstate N.Y.	40	52	-	139	123	-	1	-	16
N.Y. City	495	504	-	435	487	-	4	-	-
N.J.	180	175	3	150	76	-	1	-	-
Pa.	168	65	-	168	219	-	-	-	98
E.N. CENTRAL	148	310	2	820	566	-	4	-	15
Ohio	31	29	1	88	106	-	-	-	1
Ind.	27	26	-	75	68	-	-	-	5
Ill.	39	161	-	272	259	-	-	-	2
Mich.	35	80	1	150	105	-	3	-	3
Wis.	16	14	-	35	28	-	1	-	4
W.N. CENTRAL	65	74	-	124	118	6	3	-	126
Minn.	8	19	-	25	19	-	1	-	13
Iowa	5	11	-	11	19	1	-	-	33
Mo.	37	28	-	67	55	5	2	-	14
N. Dak.	2	-	-	3	2	-	-	-	36
S. Dak.	-	4	-	2	5	-	-	-	25
Nebr.	8	3	-	4	6	-	-	-	5
Kans.	5	9	-	12	12	-	-	-	-
S. ATLANTIC	1,517	1,578	1	928	906	4	6	3	313
Del.	10	13	-	11	9	-	-	-	-
Md.	112	120	-	62	81	1	-	-	191
D.C.	93	84	-	38	38	-	-	-	-
Va.	127	86	1	79	69	1	2	-	50
W. Va.	3	2	-	35	21	-	-	-	6
N.C.	146	185	-	136	101	1	2	2	-
S.C.	177	207	-	124	115	-	-	1	8
Ga.	-	-	-	107	138	1	-	-	37
Fla.	849	881	-	336	334	-	2	-	21
E.S. CENTRAL	448	588	-	420	406	3	-	5	55
Ky.	25	20	-	112	81	2	-	1	12
Tenn.	181	156	-	120	127	1	-	-	27
Ala.	146	195	-	138	144	-	-	1	16
Miss.	96	217	-	50	54	-	-	3	-
W.S. CENTRAL	1,354	1,510	2	578	474	3	2	3	101
Ark.	72	79	-	68	32	2	-	-	29
La.	206	267	-	125	82	-	-	-	4
Okla.	42	45	1	46	58	1	1	1	12
Tex.	1,034	1,119	1	339	302	-	1	2	56
MOUNTAIN	179	225	-	88	88	-	2	-	191
Mont.	3	1	-	5	16	-	-	-	74
Idaho	1	2	-	4	2	-	-	-	-
Wyo.	-	5	-	-	1	-	-	-	80
Colo.	53	50	-	1	3	-	-	-	-
N. Mex.	22	27	-	23	18	-	-	-	2
Ariz.	76	125	-	41	40	-	1	-	35
Utah	4	3	-	4	3	-	1	-	-
Nev.	20	12	-	10	5	-	-	-	-
PACIFIC	1,203	964	-	858	945	1	26	-	170
Wash.	16	35	-	50	38	-	2	-	-
Oreg.	26	27	-	34	32	-	-	-	-
Calif.	1,148	885	-	715	785	-	22	-	164
Alaska	-	-	-	12	44	1	-	-	6
Hawaii	13	17	-	47	46	-	2	-	-
Guam	1	2	-	-	10	-	-	-	-
P.R.	206	240	-	71	75	-	-	-	13
V.I.	-	-	U	-	1	-	-	-	-
Pac. Trust Terr.	29	15	-	5	23	-	-	-	-
Amer. Samoa	-	-	-	-	-	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending March 29, 1986 (13th Week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	719	524	130	31	18	16	74
Boston, Mass.	210	137	43	11	11	8	25
Bridgeport, Conn.	54	44	5	2	1	2	5
Cambridge, Mass.	28	22	2	4	-	-	4
Fall River, Mass.	28	23	5	-	-	-	-
Hartford, Conn.	42	28	10	3	-	1	5
Lowell, Mass.	35	28	5	1	1	-	3
Lynn, Mass.	23	17	6	-	-	-	-
New Bedford, Mass.	30	24	5	-	1	-	4
New Haven, Conn.	36	21	9	3	2	1	4
Providence, R.I.	74	60	12	-	2	-	9
Somerville, Mass.	11	10	1	-	-	-	2
Springfield, Mass.	50	37	7	4	-	2	6
Waterbury, Conn.	34	27	7	-	-	-	5
Worcester, Mass.	64	46	13	3	-	2	2
MID ATLANTIC	2,769	1,964	501	193	47	63	159
Albany, N.Y.	61	43	13	1	1	3	3
Allentown, Pa.	22	21	1	-	-	-	-
Buffalo, N.Y.	107	83	18	4	-	1	12
Camden, N.J.	42	26	10	5	-	1	-
Elizabeth, N.J.	29	24	1	3	1	-	3
Erie, Pa.†	42	29	11	-	1	1	4
Jersey City, N.J.	41	33	7	1	-	-	2
N.Y. City, N.Y.	1,453	1,013	266	119	28	27	64
Newark, N.J. §	79	72	1	1	3	2	4
Paterson, N.J.	30	18	7	4	-	1	3
Philadelphia, Pa.	316	199	63	27	9	18	18
Pittsburgh, Pa.†	78	49	22	4	1	2	5
Reading, Pa.	42	39	2	1	-	-	6
Rochester, N.Y.	156	119	25	7	1	4	18
Schenectady, N.Y.	35	25	6	3	-	1	-
Scranton, Pa.†	31	24	5	1	-	1	4
Syracuse, N.Y.	126	89	28	6	2	1	8
Trenton, N.J.	24	16	6	2	-	-	-
Utica, N.Y.	12	10	1	1	-	-	1
Yonkers, N.Y.	43	32	8	3	-	-	4
E.N. CENTRAL	2,228	1,600	354	123	66	83	107
Akron, Ohio	62	38	20	1	2	1	2
Canton, Ohio	28	23	5	-	-	-	3
Chicago, Ill.§	553	462	11	26	16	37	16
Cincinnati, Ohio	158	110	33	5	6	4	14
Cleveland, Ohio	121	89	25	2	4	1	5
Columbus, Ohio	127	88	18	15	5	1	-
Dayton, Ohio	119	78	26	8	2	5	7
Detroit, Mich.	282	162	71	33	6	9	15
Evansville, Ind.	34	27	7	-	-	-	-
Fort Wayne, Ind.	57	42	8	4	1	2	6
Gary, Ind.	13	5	5	2	1	-	-
Grand Rapids, Mich.	63	41	16	3	2	1	6
Indianapolis, Ind.	144	92	32	10	5	5	1
Madison, Wis.	51	35	9	3	1	3	7
Milwaukee, Wis.	107	85	16	1	-	5	-
Peoria, Ill.	48	35	7	-	3	3	5
Rockford, Ill.	46	34	6	1	2	3	2
South Bend, Ind.	46	36	6	-	4	-	6
Toledo, Ohio	92	62	17	5	6	2	8
Youngstown, Ohio	77	56	16	4	-	1	4
W.N. CENTRAL	680	480	130	29	18	23	35
Des Moines, Iowa	81	52	15	8	2	4	5
Duluth, Minn.	35	32	3	-	-	-	4
Kansas City, Kans.	31	23	7	1	-	-	1
Kansas City, Mo.	93	57	20	5	8	3	5
Lincoln, Nebr.	36	29	3	3	1	-	3
Minneapolis, Minn.	84	55	19	2	1	7	2
Omaha, Nebr.	84	64	15	1	3	1	3
St. Louis, Mo.	125	83	32	6	1	3	3
St. Paul, Minn.	62	50	4	2	1	5	5
Wichita, Kans.	49	35	12	1	1	-	4
S. ATLANTIC	1,262	789	269	107	34	60	70
Atlanta, Ga.	183	95	41	18	5	24	10
Baltimore, Md.	139	81	41	8	3	6	3
Charlotte, N.C.	66	41	13	5	4	3	1
Jacksonville, Fla.	84	52	21	7	2	2	7
Miami, Fla.	176	99	44	20	10	3	4
Norfolk, Va.	55	37	11	3	-	4	1
Richmond, Va.	73	50	14	2	2	5	10
Savannah, Ga.	50	29	12	5	1	3	4
St. Petersburg, Fla.	117	102	6	6	1	2	12
Tampa, Fla.	78	52	15	6	1	1	7
Washington, D.C.	215	132	45	27	4	7	8
Wilmington, Del.	26	19	6	-	1	-	3
E.S. CENTRAL	801	524	181	45	23	28	47
Birmingham, Ala.	158	94	42	7	4	11	7
Chattanooga, Tenn.	42	35	7	-	-	-	6
Knoxville, Tenn.	72	48	20	2	1	1	1
Louisville, Ky.	116	79	26	7	3	1	11
Memphis, Tenn.	158	106	35	6	8	3	9
Mobile, Ala.	76	47	10	8	3	8	5
Montgomery, Ala.	55	40	11	3	-	1	-
Nashville, Tenn.	124	75	30	12	4	3	8
W.S. CENTRAL	1,492	929	323	121	55	64	83
Austin, Tex.	53	28	12	7	3	3	6
Baton Rouge, La.	31	23	6	1	1	-	1
Corpus Christi, Tex.	44	31	8	3	1	1	4
Dallas, Tex.	221	144	34	20	11	12	11
El Paso, Tex.	70	42	11	10	3	4	7
Fort Worth, Tex.	124	79	28	10	2	5	12
Houston, Tex.	440	250	115	43	12	20	18
Little Rock, Ark.	70	48	15	3	3	1	8
New Orleans, La.	111	69	21	10	5	6	-
San Antonio, Tex.	194	131	39	6	11	7	11
Shreveport, La.	52	34	13	2	1	2	-
Tulsa, Okla.	82	50	21	6	2	3	5
MOUNTAIN	668	450	114	57	25	22	30
Albuquerque, N.Mex.	72	42	17	6	4	3	6
Colo. Springs, Colo.	34	27	4	1	2	-	1
Denver, Colo.	114	82	17	10	2	3	6
Las Vegas, Nev.	105	71	18	12	1	3	1
Ogden, Utah	21	15	2	1	1	2	3
Phoenix, Ariz.	126	78	20	18	8	2	5
Pueblo, Colo.	23	18	4	1	-	-	2
Salt Lake City, Utah	60	37	12	4	1	6	-
Tucson, Ariz.	113	80	20	4	6	3	6
PACIFIC	1,996	1,312	431	139	50	58	124
Berkeley, Calif.	28	19	7	2	-	-	-
Fresno, Calif.	76	56	8	4	2	6	5
Glendale, Calif.	33	26	5	1	1	-	3
Honolulu, Hawaii	54	37	13	2	2	-	4
Long Beach, Calif.	78	50	21	3	2	2	12
Los Angeles, Calif.	599	375	138	50	18	12	21
Oakland, Calif.	76	52	15	4	1	4	-
Pasadena, Calif.	35	23	7	2	1	2	2
Portland, Oreg.	129	85	30	7	5	2	7
Sacramento, Calif.	187	120	44	14	3	6	15
San Diego, Calif.	159	106	38	8	4	3	19
San Francisco, Calif.	136	89	22	20	1	4	3
San Jose, Calif.	137	83	36	7	3	8	18
Seattle, Wash.	161	116	26	9	3	7	7
Spokane, Wash.	52	33	11	3	3	2	6
Tacoma, Wash.	56	42	10	3	1	-	2
TOTAL	12,615††	8,572	2,433	845	336	417	729

* Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

** Pneumonia and influenza.

† Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

†† Total includes unknown ages.

§ Data not available. Figures are estimates based on average of past 4 weeks.

Diabetes Control — Continued

National Research Council
State Diabetes Control Programs
Women's, Infants', and Children's Nutrition Programs (WIC)

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Epidemiologic Notes and Reports

Measles — New Jersey

An ongoing measles outbreak in New Jersey that began in November 1985 is the largest U.S. measles outbreak since 1983. Information is available on the 334 cases reported between November 15, 1985, and March 13, 1986 (Figure 1). Seventeen (5.1%) cases have been serologically confirmed. Residents of Jersey City accounted for 269 (80.5%) cases; cases have also occurred among residents of 14 other municipalities surrounding Jersey City. The index patient was a 2½-year-old Hispanic child who developed a rash on November 15, 1985. The source of his infection is unknown. Of the total 334 patients, 38% had Hispanic surnames.

Of the 322 patients with known age, 197 (61.2%) were preschool-aged children (under 5 years of age). Of these 197, 100 (50.8%) were under 16 months of age (too young for routine measles vaccination), and 97 (49.2%) were 16 months-4 years of age. In Jersey City, attack rates were 13.0/1,000 for infants under 1 year of age, 8.8/1,000 for 1- to 4-year-olds, and between 1.0/1,000 and 2.3/1,000 for persons in the 5- to 19-year age groups.

Complications occurred among 45 (13.5%) of these 334 patients. Thirty-two (9.6%) had pneumonia; four (1.2%) had otitis media; six (1.8%) had diarrhea; one (0.3%) had encephalitis;

Measles — Continued

and two (0.6%) had other complications. Seventy (21.0%) were hospitalized. There were no measles-associated fatalities.

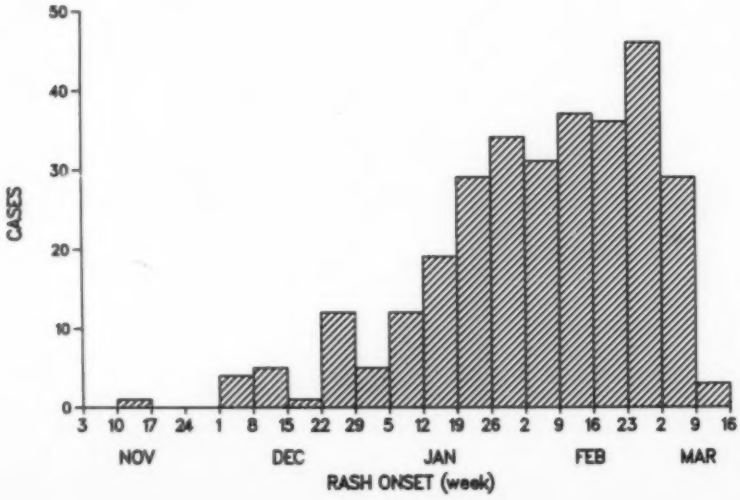
Transmission occurred in a variety of settings, including hospital inpatient units and emergency rooms, outpatient diagnostic settings, physicians' offices, medical clinics, schools, day-care centers, and homes.

Preventability status was known in 316 cases*; 109 (34.5%) were preventable by CDC criteria (*1*). Of these, 86 (78.9%) occurred among preschoolers (16 months-4 years), and 23 (21.1%) occurred among school-aged children. Of the 207 nonpreventable cases, 100 (48.3%) were among children under 16 months of age, including 59 under 12 months of age, and 41 12-15 months of age. One hundred one (48.8%) were school-aged children with histories of appropriate vaccination (vaccination at 12 months of age or older), and six (2.9%) were born before 1957 (too old for routine vaccination).

Outbreak-control activities included intensified surveillance; mass publicity through newspapers, radio, and television; audits of school and day-care center records; and additional free vaccination clinics at various locations throughout Jersey City. On January 22, 1986, the recommended age for measles vaccination in Jersey City during the outbreak was lowered to 12 months. Nine additional vaccination clinics were held. However, only 156 of approximately 1,000 children 12-15 months of age in Jersey City presented for vaccination. On March 12, because of the continuing high attack rate among children under 12 months of age, the recommended age for measles vaccination during the outbreak was lowered to 6 months, with revaccination at 15 months of age.

*Cases among preschool-aged children 16 months-4 years of age for whom there were no data on vaccination status were assumed to be preventable.

FIGURE 1. Reported measles cases, by date of rash onset — New Jersey, November 15, 1985-March 13, 1986



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Editorial Note: This outbreak is occurring primarily in Jersey City, a city with a population of approximately 223,500, of which 27% is black non-Hispanic and 18% is Hispanic. There is also a large undocumented alien population in the city. This outbreak is different from most recent U.S. outbreaks in that a large proportion of cases has occurred among preschool-aged children. Most recent outbreaks have occurred in junior or senior high schools or universities (*2-4*).

Immunization levels in preschool-aged Jersey City children are known to be low. Although current information is not available, a retrospective survey conducted in 1981 indicated that only 56% of Jersey City children had been vaccinated by 2 years of age (*5*). Nationwide, immunization levels for preschool-aged children are lower than those for school-aged students (which are greater than 95%), since most preschoolers are not enrolled in institutions (e.g., day-care centers) that uniformly require immunization for entry. However, immunization levels for 2-year-olds in Jersey City are lower than those in suburban areas of New Jersey (81%) (*5*) as well as the national average (66%-84%) (*6*). Thus, it appears that the size and extent of this outbreak reflect a large pool of susceptibles in the preschool-aged population. These susceptible preschoolers have probably contributed to the spread of measles to children under 16 months of age. In most parts of the United States, children in this age group have a low probability of exposure to measles. Therefore, the Immunization Practices Advisory Committee currently recommends that children be vaccinated against measles at 15 months of age.

Although multiple modes of transmission have been identified in this outbreak, a large proportion of transmission has occurred in medical settings. Some medical-setting transmission occurred when young children were taken to physicians during the prodrome of their illnesses (when they are infectious, but without rash). However, transmission was also the result of inadequate isolation of children with rash illnesses (*7*).

Outbreak-control efforts have been frustrated by the lack of public response to vaccination efforts by the New Jersey State Department of Health. While lowering the age of vaccination to as low as 6 months of age is an important control measure (*8*), if infants and children are not vaccinated, this will have little impact on the outbreak.

The Jersey City outbreak has recently spread to Patterson, a neighboring city, where preschool-aged children have predominantly been affected. There may be similar low immunization levels among preschoolers in other urban areas of New Jersey and elsewhere in the United States, creating a potential for similar outbreaks to occur. Increased efforts should be directed at increasing immunization levels in this hard-to-reach age group.

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Current Trends

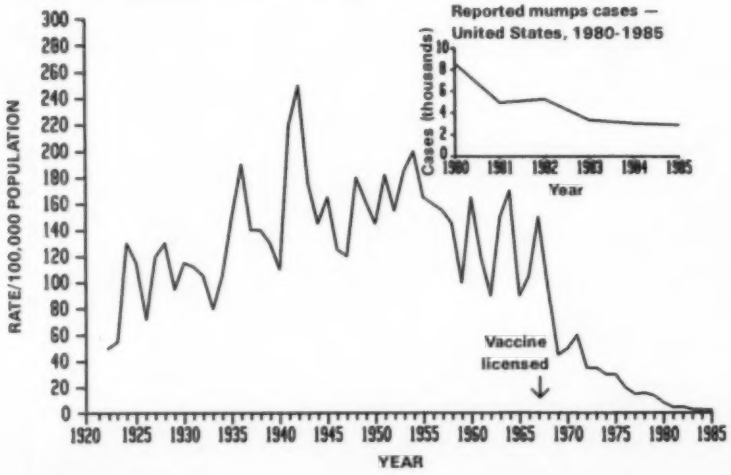
Mumps — United States, 1984-1985

For 1985, a provisional total of 2,886 mumps cases (1.2 cases/100,000 population) was reported in the United States; this is the lowest annual total since mumps became a nationally notifiable disease in 1968. The 1985 figure represents a decrease of 4.5% from the 1984 total of 3,021 cases and a 98.1% decline from 1968, the year after live mumps vaccine licensure, when 152,209 cases were reported to CDC (Figure 2).

Provisionally, for 1985, 28 of the 47 states where mumps is a notifiable disease reported fewer mumps cases than in 1984; mumps is not a notifiable disease in three states (New Mexico, Oklahoma, Oregon). One state (South Dakota) reported no mumps cases. By comparison, for 1984, 25 of the 47 states where mumps is a notifiable disease reported fewer cases of mumps than for 1983. Two states (Louisiana, South Dakota) reported no mumps cases for 1984. Mumps cases were reported from 23.3% of 2,994 reporting counties in 1984, compared with 24.8% of 2,927 reporting counties in 1983. Age and county data are not yet available for 1985.

However, national age-specific data are available for 2,654 (87.9%) of the mumps cases reported for 1984 (Table 1). As in the prevaccine era, persons under 15 years of age continued to have the highest incidence rate (4.4 cases/100,000 population). In contrast, the rate for persons 15 years of age or older was 0.4/100,000. As in 1982 and 1983, the school-aged population continued to both account for the majority of cases and have the highest risk for disease. Approximately three-fourths of mumps patients of known age reported in 1984 were 5-19 years of age. Children 5-9 years of age had the highest incidence rate

FIGURE 2. Mumps incidence rates — United States, 1922-1985*



*Provisional data.

Mumps — Continued

(5.9/100,000) in 1984; children 10-14 years of age had the next highest (5.0/100,000). During 1982, the highest age-specific incidence shifted for the first time from the 5- to 9-year age group to the 10- to 14-year age group, primarily because of a large outbreak in Ohio among junior high and high school students. This pattern was not observed in 1983 and 1984. Although the reported mumps incidence remained essentially the same from 1983 to 1984 for persons 10-19 years of age, a 16%-18% decline was noted in other age groups for which vaccine is recommended. The largest decreases occurred among children under 10 years of age. For all age groups routinely receiving vaccine, there were declines between 1982 and 1984 of 14.7% to 56.1%, with the largest decreases observed in 10- to 19-year-olds.

Long-term age-specific data on mumps cases are available from three reporting areas that have continually collected such data (California, Massachusetts, New York City) from the time of vaccine licensure to the present (Table 2). In the years immediately following vaccine licensure (1967-1976), the highest reported incidence rate occurred among 5- to 9-year-olds, followed by children under 5 years of age. Together, these two groups accounted for over 70% of all reported cases. More recently (1980-1984), these two age groups accounted for 50% of reported cases due to disproportionate decreases in mumps incidence relative to persons 10 years of age or older. As a result, risk to children 10-14 years of age approximated that of children 5-9 years of age during 1980-1984. Conversely, the proportion of mumps cases occurring among 10- to 14-year-olds increased from 13.8% in 1967-1971 to 22.8% in 1980-1984. The proportion of total cases occurring among persons 15 years of age or older also changed from 5.8% to 27.4% between the earlier and recent periods. However, there was a 91.4% reduction in reported mumps incidence in this age group during 1980-1984 relative to 1967-1971. Independent of these temporal shifts in age distribution of mumps cases toward older children and adults, all age groups had a 90% or greater reduction in the risk of acquiring mumps for 1980-1984 relative to 1967-1971.

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TABLE 1. Age distribution of reported mumps cases and estimated incidence rates* — United States, 1982-1984

Age group (yrs.)	1982			1983			1984			Rate change (%)
	No.	(%)	Rate*	No.	(%)	Rate*	No.	(%)	Rate*	1982-1984
< 1	27	(0.7)	1.0	16	(0.8)	0.7	37	(1.4)	1.2	+20.0
1-4	339	(8.7)	3.4	317	(15.3)	3.7	384	(13.7)	2.9	-14.7
5-9	1,058	(27.0)	8.9	708	(34.1)	7.2	842	(31.7)	5.9	-33.7
10-14	1,523	(38.9)	11.4	535	(25.8)	4.9	771	(29.1)	5.0	-56.1
15-19	611	(15.6)	4.1	249	(12.0)	2.1	335	(12.6)	2.0	-48.8
≥ 20	355	(9.1)	0.3	249	(12.0)	0.2	305	(11.5)	0.2	-33.3
Total, known age	3,913	(74.3)	-	2,074	(61.8)	-	2,654	(87.9)	-	-
Total, unknown age	1,357	(25.7)	-	1,281	(38.2)	-	367	(12.1)	-	-
Total	**5,270**	**(100.0)**	**2.3**	**3,355**	**(100.0)**	**1.4**	**3,021**	**(100.0)**	**1.3**	**-43.5**

*Cases/100,000 population (projected census data) extrapolated from the age distribution of patients with known age. Not adjusted for states not reporting mumps: 1982 and 1983—Florida, New Mexico, Oklahoma, Oregon; 1984—New Mexico, Oklahoma, Oregon.

Mumps -- Continued

Editorial Note: Since licensure of live mumps vaccine in December 1967, more than 70 million doses have been distributed in the United States, with an accompanying 98.1% decrease in reported cases.

While a 1984-1985 nationwide survey found that 97% of school entrants and 93% of children attending licensed day-care centers were immunized against mumps (*1*), the school-aged population continues to be the group at highest risk for disease. Older children, such as those involved in outbreaks in Ohio in 1982 (*2*) and New Jersey in 1983 (*3*), represent unvaccinated cohorts that still exist in many areas of the country where compulsory state school-immunization requirements do not cover the entire K-12 cohort of school-aged children.

During the 1985-1986 school year, mumps immunization is required for school entry or school attendance in 32 states and the District of Columbia. However, this requirement applies to all students (K-12) in only 16 of 32 states. Currently, 18 states do not require proof of mumps immunity for school entry. Mumps incidence data from 1984 demonstrated that the incidence rate of mumps in states with no school mumps immunization law (1.9/100,000 population) was 1.7-fold higher than that in states with such a law (1.1/100,000). The effect of a school law was even more apparent in a mumps outbreak among schoolchildren in New Jersey (*3*). Children not covered by the state's school entry law had a fivefold higher risk for mumps than children affected by the law. This observation indicates that further declines in the reported mumps incidence rate can be expected as more children entering school are required to provide proof of mumps immunity for school attendance. It is clear that school immunization laws will be important to achieving the 1990 goal of less than 1,000 reported mumps cases annually (*4*).

Since live mumps vaccine was licensed, it has continued to be shown to be safe, effective, and cost-beneficial (*2,3,5-9*). A recent benefit-cost analysis based on national data for 1983 determined that an immunization program using single-antigen mumps vaccine would reduce costs associated with mumps by almost $340 million, with a benefit-cost ratio of 6.7 (*9*). This study found a benefit-cost ratio of 14.4 for an immunization program using combined measles-mumps-rubella (MMR) vaccine. The savings attributable to the use of combination rather than single-antigen vaccine totaled nearly $60 million. Because the potential for outbreaks will continue in unvaccinated cohorts, considerable medical and economic savings can be realized by including immunization with MMR vaccine as part of compliance with state

TABLE 2. Age distribution of reported mumps cases* and estimated incidence rates† -- California, Massachusetts, New York City, 1967-1971,§ 1972-1976,§ 1980-1984§

Age group (yrs.)	1967-1971¶			1972-1976			1980-1984**			Rate change 1967-1984
	No.	(%)	Rate	No.	(%)	Rate	No.	(%)	Rate	
< 5	2,932	(17.1)	102.5	1,125	(18.7)	41.2	95	(18.9)	3.8	-96.3
5-9	10,413	(60.8)	336.8	3,272	(54.3)	105.8	155	(30.9)	6.3	-98.1
10-14	2,372	(13.8)	75.5	992	(16.5)	31.6	115	(22.9)	4.2	-94.4
≥ 15	1,418	(8.3)	5.8	633	(10.5)	2.6	137	(27.3)	0.5	-91.4
Total	**17,135**	**(100.0)**	**51.1**	**6,022**	**(100.0)**	**18.0**	**502**	**(100.0)**	**1.4**	**-97.3**

*Cases of unknown age excluded.

†Reported cases/100,000 population.

§Average annual figure over 5-year period.

¶Represents prevaccine years.

**These selected data accurately reflect changes using total U.S. data; 1980 population data used.

Mumps — Continued

school-immunization laws. Current data indicate that vaccine-induced immunity persists for at least 19 years and will likely be lifelong.

Appropriate administration of mumps vaccine to susceptible adolescents and young adults should be emphasized. In 1984, 305 (11.5%) persons of known age with mumps were 20 years of age or older. Older individuals are at higher risk for mumps complications. Although mumps is generally a self-limited disease, meningeal signs may appear in up to 15% of cases. Adult males are particularly at risk of orchitis, which occurs in up to 20% of clinical cases in postpubertal males.

Persons are considered immune to mumps if they have a dated record of vaccination with live mumps vaccine on or after the first birthday, documentation of physician-diagnosed disease, or laboratory evidence of immunity. Those lacking adequate documentation of mumps immunity should receive mumps vaccine. In addition, persons who received killed mumps vaccine (available in the United States from 1950 to 1978) might benefit from vaccination with live mumps vaccine. MMR is the vaccine of choice for persons likely to be susceptible to measles and/or rubella, as well as to mumps.

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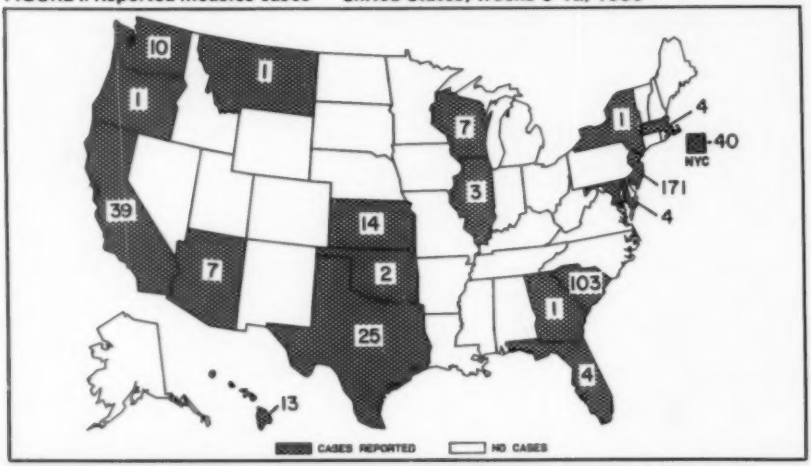
Erratum: Vol. 35, No. 12

p. 188 In the article, "Years of Potential Life Lost Attributable to Low Birthweight—United States, 1980 Birth Cohort," the formula in the second footnote should be:

†Population-attributable risk = (D - [BR])/T.

FIGURE I. Reported measles cases — United States, weeks 9-12, 1986



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The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday.

The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: ATTN: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333.

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